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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/967,157	09/28/2001	Richard D. Harris	01AB091	4953

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EXAMINER

COTHORN, JUDITH A

ART UNIT

PAPER NUMBER

2822

DATE MAILED: 08/14/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/967,157

Applicant(s)

HARRIS ET AL.

Examiner

Judith A. Cothorn

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-- Th MAILING DATE of this communication appears on the cover sheet with the correspondenc address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 September 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-52 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13, 16-22, 25-31, 34-47, 51 and 52 is/are rejected.
- 7) ☒ Claim(s) 14, 15, 23, 24, 32, 33 and 48-50 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5 and 6 6) ☐ Other: _____

DETAILED ACTION

This office action is in response to the filing of the application on September 28, 2001.

Specification

1. The disclosure is objected to because of the following informalities: the stationary MEMS element 153 in figure 22 as described in paragraph 0081 of the specification is not labeled on the drawing sheet.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1, 13, 17-18, and 51-52 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation "the recess" in line 8 of claim 1. There is insufficient antecedent basis for this limitation in the claim.

Claim 13 recites the limitation "thinning the substrate such that the alignment hole..." in lines 1-2 of claim 13. The claim is rendered indefinite since the alignment hole is formed in the wafer and not the substrate.

Claims 17 and 18 recite the limitation "first and second layers" in line 2 of claim 17. There is insufficient antecedent basis for this limitation in the claim. Also, the limitation "etching an alignment hole...through the substrate" in line 2 of claim 17 is indefinite since the alignment hole is formed through the first and second layers on the wafer and not the substrate.

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Claims 51 and 52 recite the limitation "etching an alignment hole...through the substrate" in lines 1-2 of claim 51. The claim is rendered indefinite since the alignment hole is formed through the first and second layers on the wafer and not the substrate.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

3. Claims 1, 16, 19, 25, and 28 are rejected under 35 U.S.C. 102(e) as being anticipated by Greywall (6,356,689).

Greywall discloses a method comprising the steps of: (a) providing a silicon wafer (202) with at least a first (204d) and second layer (206d); (b) removing a portion of the first layer to form a bridge member (420, 720) (column 10, lines 34-44; figures 4g-4h, 7i, columns 6-7); (c) after step (b), attaching the wafer to the upper surface of a substrate to form a composite structure having an internal void formed therein (fig. 7I; column 10, lines 45-50), wherein the bridge member (720) is aligned with the internal void (fig. 7I; column 10, lines 50-51); (d) and etching through the upper layer wafer around the periphery of the bridge member (720) to break through the recess, thereby releasing the bridge from mechanical communication with the substrate (column 10, lines 52-56).

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In re to claim 16, wherein a pair of spacers (416) define a recess (G) therein.

In re to claim 25, wherein the bridge member (420, 720) is silicon.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 7-9, 29, 35, 39, and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Greywall (6,356,689) in view of Kawai (6,391,742).

Greywall discloses a method comprising the steps of: (a) providing a silicon wafer (202) with at least a first (204d) and second layer (206d); (b) removing a portion of the first layer to form a bridge member (420, 720) (column 10, lines 34-44; figures 4g-4h, 7i, columns 6-7); (c) after step (b), attaching the wafer to the upper surface of a substrate to form a composite structure having an internal void formed therein (fig. 7I; column 10, lines 45-50), wherein the bridge member (720) is aligned with the internal void (fig. 7I; column 10, lines 50-51); (d) wherein a pair of spacers defining a recess therebetween, and etching through the upper layer wafer around the periphery of the bridge member (720) to break through the recess, thereby releasing the bridge from mechanical communication with the substrate (column 10, lines 52-56).

Greywall fails to disclose the void is formed by pre-patterning a recess into a surface of the wafer prior to step (c) and bonding the surface to the substrate; the pre-patterning of a recess

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into the surface of the substrate prior to step (c) and bonding the surface to the wafer; or the recess having beveled edges.

Kawai discloses the void being formed by pre-patterning a recess into a surface of the wafer prior to step (c) and bonding the surface to the substrate; the pre-patterning of a recess into the surface of the substrate prior to step (c) and bonding the surface to the wafer; or the recess having beveled edges (figure 7, column9, lines 13-22).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of Greywall to form the recess as described above and the recess having beveled edges as taught by Kawai in order to adjust and control a desired distance between the bridge member (420, 720) and the substrate support.

5. Claims 4-6, 28, 42-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Greywall (6,356,689) as applied to claim 1, 16, and 39 above, in view of Kawai (6,391,742) and further in view of Coldren et al. (5,877,038).

Greywall, as modified, fails to disclose the substrate to be selected from the group of silicon, silicon carbide, ceramic, crystalline sapphire, gallium arsenide, glass, and high resistivity silicon and the wafer to be selected from the group of silicon, silicon carbide, and gallium arsenide.

Coldren et al disclose the interchangeable use of substrates from the group of silicon, silicon carbide, ceramic, crystalline sapphire, gallium arsenide, glass, and high resistivity silicon and the use of wafers from the group of silicon, silicon carbide, and gallium arsenide (column 3, lines 26-30).

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Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the selected groups of materials as taught by Coldren et al in the method of Greywall because these materials are alternative for substitution and are just as effective in bonding to another substrate or wafer for use as a support.

6. Claims 2-3, 26-27, 34, 38, 40-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Greywall (6,356,689) as applied to claims 1, 16, 29, 35, and 39 above, in view of Kawai (6,391,742) and further in view of Jacobsen et al. (6,316,278).

Greywall, as modified, fails to disclose the depositing and patterning of a conductive layer consisting of aluminum, copper, silver, gold, and nickel.

Jacobsen et al disclose the depositing and patterning of a conductive layer consisting of aluminum and gold (column 6, lines 39-41; 52-56; column 7, lines 14-25).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to deposit and pattern an aluminum, copper, or gold layer as taught by Jacobsen et al in the method of Greywall in order to provide an electrical connection between the mirrors and the electrical contact pad. It also would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute silver and nickel for the conductive layer, as these are alternative materials for forming an conductive layer to be used as an electrical connect.

7. Claims 10, 11, 20-22, 30-31, 36-37, and 46-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Greywall (6,356,689) as applied to claims 1, 16, 29, 35, and 39 above, in view of Kawai (6,391,742) and further in view of Huibers (6,356,378).

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Greywall, as modified, fails to disclose the bridge member comprising an insulating material of silicon dioxide.

Huibers discloses the bridge member comprising an insulating material of silicon dioxide (column 18, lines 10-14).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the bridge member of Greywall out of an insulating material of silicon dioxide as taught by Huibers because the bridge member is just as effective when formed out of alternative materials.

8. Claims 12-13, 17-18, 51-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Greywall (6,356,689) as applied to claims 1, 16, 29, 35, and 39 above, in view of Kawai (6,391,742) and further in view of McNie et al (US2002/0017132).

Greywall, as modified, fails to disclose the etching of an alignment hole into the wafer and the thinning of the wafer such that the alignment hole extends entirely through.

McNie discloses the etching of an alignment hole (52, 54) into the wafer (paragraph 157) and the thinning of the substrate such that the alignment hole extends entirely through (paragraph 160).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Greywall to etch an alignment hole into the wafer as taught by McNie because the alignment hole will serve as an alignment marker when forming the bridge member. It also would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Greywall to thin the substrate such that the alignment hole

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extends entirely through the substrate as taught by McNie because the alignment hole will serve as an alignment marker for subsequent processing of the substrate.

Allowable Subject Matter

9. Claims 14- 15, 23-24, 32-33, and 48-50 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. None of the references of record teach or suggest a method for forming a conductive member extending from the bridge and is separated and electrically isolated from a stationary member via a variable size gap.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Judith A. Cothorn whose telephone number is 703-305-4733. The examiner can normally be reached on Mon-Fri, 8am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr. can be reached on 703-308-4940. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

jac
August 12, 2002


SUPERVISORY PRIMARY EXAMINER
TECHNOLOGY CENTER 2800